Impact of a Goal-Directed COPD Care Model on Clinical and Patient-Reported Outcomes: A Pilot Feasibility Study

Study Protocol

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1.0 PROJECT SUMMARY

Chronic obstructive pulmonary disease (COPD) is an incurable and progressive lung disease associated with poor quality of life (1). At The Ottawa Hospital (TOH), 20% of patients with COPD are readmitted to hospital within 30-days after discharge, and COPD is responsible for the highest 30-day readmission rate to the emergency room in Ontario when compared to other chronic diseases (2).

Integrated COPD care programs (ICPs) are promising interventions have been shown to improve quality of life and readmission rates in the COPD patient population (3). ICPs are disease management programs which aim to systematically reduce fragmented patient care; a central problem in today’s health system. ICPs often include patient education, self-management, access to a case manager, and care interventions that address the psychological and rehabilitative aspects of the disease (e.g. pulmonary rehabilitation) (4). Studies of integrated care program effectiveness have yielded conflicting results with respect to clinical outcomes. The interventions within the care programs are not often explicitly reported in a way that would allow for replication in other sites. Further, cost effectiveness of ICPs has not been well studied, and the most-appropriate target patient population which could benefit most from these care interventions has not been identified. Most ICPs were also designed as a ‘one-size-fits-all’ model, where all enrolled COPD patients would receive similar care. Lastly, patient reported outcome data in these studies is notably absent. (4, 5).

To address these stated shortcomings, we developed a unique goal-directed COPD care program which streamlines most appropriate care and health resources based on the degree of frailty of a patient. This care model begins at the onset of a hospitalization and integrates ongoing disease management services and programs in the community after hospital discharge. Using this goal-directed frailty-based integrated system of care, we aim to improve the confidence of patients to cope with health challenges, improve health system outcomes, and reduce costs of care. In this preliminary study, we will determine whether it is feasible to implement our goal-directed, frailty-based COPD care pathway in a large hospital setting. We will also evaluate our ability to measure patient reported and important health service outcomes.

2.0 BACKGROUND

COPD is an incurable and debilitating lung disease that causes progressive breathlessness, disability, poor quality of life, and premature death (1). COPD is characterized by progressive airflow obstruction and recurring 'flare-up's' (also known an exacerbations) that often require patients to seek medical attention in an emergency department (1). Most cases of COPD are caused by long-term tobacco use and exposure to biomass fuels (1).
COPD affects over 300 million people worldwide and accounts for 5% of global deaths (10). It is the only chronic disease in which the mortality rate is still rising (11,12). COPD is also a leading cause for hospital admission and the number one reason for hospital readmissions among chronic illnesses in Canada (13).

COPD is estimated to exceed 700 million dollars annually to the Canadian health system (14). The majority of this cost is related to the hospitalizations and readmissions of COPD patients (14). The highest in-hospital costs are borne by patients with COPD who are frail and those with increased physical care needs (15,16).

A recent evidence synthesis performed by Health Quality Ontario (HQO) aimed to answer important questions relating to patient and caregiver experiences over the course of illness for patients with COPD (17). The authors reviewed and summarized a decade worth of qualitative evidence to understand the daily life experiences of patients with COPD. The resulting information offers valuable insights on the types of interventions that could have a substantial impact on the experiences of patients with COPD (17).

Below is a summary of several important themes identified by HQO in their knowledge synthesis of patients’ experiences with COPD.

• Patients may not realize that COPD is incurable and fatal; some physicians themselves do not consider early COPD to be a fatal disease.
• Patients may not attribute repeated exacerbations to advancing disease, seeing them as temporary setbacks instead.
• Economic hardship, co-morbidities, language barriers, low health literacy can make coping difficult.
• Many factors that isolate COPD patients from social contact also isolate them from health care professionals (or seeking out health care).
• Lack of confidence in community-based services leads some patients to seek hospital admission, but patients also feel vulnerable when hospitalized.
• Patients feel dependent on others for care or traumatized by hospital care routines
• Upon discharge following an exacerbation, patients may face new levels of uncertainty about their illness, prognosis, care providers, and supports.
• Patients tend to be poorly informed about the long-term prognosis of COPD, and what to expect toward the end of life; lack of understanding impairs quality of life as disease progresses.
• A palliative care referral can convey the demoralizing message that care providers have “given up”.
These valuable insights from patients and their caregivers underscore the need for improved disease-specific education, the nature of symptoms and prognosis, re-enforcement around the use of pharmacologic and non-pharmacologic treatments over time, and readily available access to a health care professional who could connect the patient to the most appropriate health services.

Studies have demonstrated that Integrated COPD care models are associated with reduced readmission rates and improved quality of life in single center studies (3, 4, 19). However, studies of integrated care models make it difficult to discern which aspect of the care programs can be replicated and scaled in other sites and settings. It is also unclear which COPD patients derive most benefit from these programs, what effect there is on patient reported outcomes, and what resources are required to effectively run and scale these programs. As a result, the American Thoracic Society (ATS) has highlighted the need for further studies to evaluate components of care models on patient centered outcomes and to better define sub-types of COPD patients who might benefit from integrative care models (4).

Previous care models have used a `one-size-fits-all' approach to care, in which all-comers with COPD are offered the same set of interventions and treatment. However, all COPD patients are not alike. Simply classifying patients by their lung function or age does not correlate with symptoms or outcomes (20). Patients with COPD are often managing multiple comorbidities, mental health conditions, addictions, and social factors that contribute to their overall health care utilization. These factors underscore the need to have a more personalized and multidisciplinary care-delivery approach in this patient population.

Based on our knowledge of existing integrated care programs, we developed a unique integrated care program specifically for COPD patients. This care model begins in the hospital setting when a patient is admitted with an acute COPD exacerbation. Evidence based care including disease-specific education is provided and a safe transition after discharge is planned by integrating the patient with a variety of community services (education, rehabilitation, home care, disease-specific outreach, etc.). Continuity of care for the patient is provided through healthcare providers who straddle both the community and hospital settings.

Our integrated care model is unique as it groups hospitalized patients with COPD into functional health states using a validated clinical frailty indicator (8). Specific health goals are correlated with each health state and recommendations are made to involve various care providers to meet these goals (see Appendix B).

The following are additional unique features of the proposed care model:
The care model is organized into 3 phases of hospital care relevant to the rescue, optimization, and safe transition.

Hospital care delivery will be integrated with community care delivery through the pre-existing COPD Outreach program for frail individuals with most severe disease (i.e. those most likely to benefit from close follow up and management). The outreach program consists of follow up phone calls at 3 and 12 months, a home visit, ongoing education, and a hotline that patients may call if they have concerns. Individuals with less severe disease will be linked to existing COPD education and maintenance pulmonary rehabilitation programs in the community to ensure ongoing support and follow up.

The care model also incorporates testing to confirm the COPD diagnosis, and reinforces the importance of performing spirometry to confirm the diagnosis. This is a 'real world' issue, as many patients presenting to hospital with “COPD” have never actually been formally diagnosed (20). Confirmation of diagnosis offers an opportunity to intervene with treatments to improve quality of life in the long term.

We will use a patient reported outcome measure engagement called 'Health Confidence' as an outcome for this care model. Health confidence has not traditionally been a patient reported outcome in COPD, but patients consistently indicate it to be an important issue (17). Improving the health confidence of patients can contribute to improved health outcomes, better care experiences, and likely fewer health care services with less cost (27).

3.0 OBJECTIVES

The objectives of this study are to:

a) Determine the feasibility of implementing a novel COPD care model on a respiratory ward in a tertiary care hospital using quantitative and qualitative implementation metrics.

b) Determine the process measures and personnel required for successful replication of this care model intervention at other sites.

c) Use the results of this pilot feasibility study to determine the optimal study design and plan for a larger scale analysis to study the effect of this care model on health system and patient-reported outcomes.

4.0 HYPOTHESIS

We hypothesize that goal-directed care delivery which is tailored to the functional health status of patients will improve patient engagement (health confidence) and translate into improved health service and clinical
outcomes in the short and long term. To rigorously test this hypothesis, we must first demonstrate feasibility of this complex intervention.

5.0 MULTI-DISCIPLINARY STUDY AND CLINICAL CARE TEAM

- **Sunita Mulpuru, MD FRCP MSc (Project Lead):** Dr. Sunita Mulpuru in a full-time respirologist in the Department of Medicine, Associate Scientist at the OHRI, and the clinical quality lead in the Division of Respirology. She has 70% protected time for clinical research activities, will supervise the project team, and contribute 0.2 FTE per week to this project.

- **Alan J. Forster, MD FRCP MSc (Project Co-Lead):** Dr. Alan Forster is a full-time internist in the Department of Medicine and the Vice President of Quality, Performance and Population Health at The Ottawa Hospital. He will facilitate the involvement of important stakeholders and provide oversight to scale the implementation of the care model.

- **Justin Presseau, PhD:** Dr. Justin Presseau is an associate scientist at the Ottawa Hospital Research Institute (OHRI) with expertise in implementation science and use of audit/feedback research techniques. He will provide methodological and analytical guidance for the implementation of the care model. He will contribute approximately 20 hours of time.

- **Jacqueline Sandoz, MD FRCP and Wendy Laframboise, APN:** Dr. Sandoz and Ms. Laframboise are co-leads of the INSPIRED-COPD Outreach team at TOH. This innovative program is fully operational with permanent funding and will integrate with the hospital care model to ensure long term follow up for patients in the community. Dr. Sandoz and Ms. Laframboise will participate in the data acquisition and analysis, and contribute approximately 40 hours of time.

- **Barbara d’Entremont RN:** Barbara d’Entremont is the corporate coordinator for clinical pathways at TOH, and facilitated the initial development of the COPD care pathway and order set. She will assist with ongoing pathway production.

- **Caroline Tessier RRT & Nha Voduc MD FRCP:** Caroline Tessier is the lead respiratory therapist in the Pulmonary Function Test (PFT) laboratory at TOH. She will coordinate and supervise the involvement of certified respiratory educators on the respiratory ward and ensure delivery of standardized education. Dr. Voduc is a staff respirologist at TOH and medical director of the PFT laboratory. He was an author on the Canadian COPD Guidelines, and will provide guidance to the project from a clinical perspective.

- **Jan Leahy RN:** Jan Leahy is the nurse manager on the 6NW ward at TOH. She is responsible for the nursing staff on the ward, and for coordinating hospital-based clinical care in Respirology, Thoracics,
and Otorhinolaryngology (ENT). She will assist with nursing staff engagement throughout the project and the development and revisions of care processes related to the care model.

- **Aaron Leblanc, MD, PGY-5 Respirology Resident**: Dr. Leblanc is a senior Respirology trainee who will participate in aspects of the study, including calibration of frailty ratings by nursing staff, data collection in focus groups, and manuscript writing.

### 6.0 METHODS

**6.1 Design**: A prospective, mixed-methods, cohort study design at The Ottawa Hospital (TOH) to evaluate feasibility of this complex intervention.

**6.2 Study population and Inclusion Criteria**: We will include adult patients admitted to the 6NW (Respirology ward) of the General campus at TOH with a primary diagnosis of acute exacerbation of COPD (AECOPD). The diagnosis is based on the admitting physician’s assessment of the patient in the emergency room.

We will also include approximately 20 health care workers (nurses, physicians, and allied health professionals) who care for patients on the 6NW of the General campus at TOH who have implemented and worked with the COPD care pathway during the study duration.

**6.3 Time Frame**: Implementation and feasibility data will be collected between November 2017 and April 2018. This time frame corresponds to the peak season for COPD-related hospitalizations (22).

**6.4 Consent Process**: Patients eligible for the study will be approached by the study respiratory nurse educator (RT), who is already part of the patients’ circle of care. The RT will ensure the potential participant understands the study and what it would require of them (two questionnaires: one in hospital and one during a 3-month post-discharge visit). If the patient accepts, the RT will ask them to review the Informed Consent Form and sign if they agree to participate in the study.

The clinical manager of the Respiratory ward of Respiratory ward of TOH will approach Healthcare professionals (HCPs) who work on the Respiratory ward (6NW) of TOH, General campus and have used the COPD care pathway to participate in the study. Consent forms and questionnaires will be available at the nurse’s station of the Respiratory ward, of TOH General campus. The consent form
requests a consent to complete a questionnaire and participate in the focus group with other HCPs. If the HCP chooses to participate, the signed informed consent is placed in one box, while the completed questionnaire is placed in another. This is to conserve anonymity of the questionnaire responses. Once focus group times and location are set, an email will be sent out by a member of the study team to inform those who consented to participate of the focus group time and location.

6.5 Implementation of the Goal-Directed Care Pathway: Patients enrolled in the study will receive standardized treatment using an initial physician order set followed by a clinical care pathway (Appendix B). The order set and care pathway will be physically added to the patient's chart for daily reference by the health care team.

The care pathway (see Appendix B) consists of orders to be executed by the nursing staff, attending physician, and allied health professionals (respiratory therapy, occupational therapy, and physiotherapy, where applicable) while the patient is hospitalized. None of the components of the pathway extend beyond standard care that would be provided at TOH.

To initiate the care pathway, the first nurse to admit the patient will complete a frailty assessment and document the patient's clinical frailty score (8). This validated frailty score is associated with a set of expected treatment goals and outcomes for the patient during hospitalization and will serve to guide the subsequent care for the patient.

Following the frailty assessment, the care pathway is divided into three phases: rescue, optimization, and safe transition. The interventions in each phase are tailored to the COPD patient based upon their frailty rating. Evidence-based pharmacologic treatments, consultations with allied health professionals, medical services (e.g. Palliative care), and multidisciplinary educational interventions (Appendix A) are ordered in each phase where appropriate. In the safe transition phase, follow up with primary care, and referrals to pulmonary rehabilitation and the COPD outreach program will be arranged where appropriate.

6.6 Sample Size:

6.6.1 Patients: We aim to recruit 50 unique patients over a 7-month period to use the care pathway. The Ottawa Hospital admits over 500 patients with acute exacerbations of COPD annually and approximately 30% of these patients are admitted to the
respiratory inpatient service (150 patients). Given that COPD exacerbations are twice as common in the winter months (22), we feel our recruitment target of 50 patients is feasible between November 2017 and April 2018.

6.6.2 **Health Care Professionals (HCPs):** We aim to recruit 20 HCPs, 2 groups of 10 participants, to discuss their personal experiences with the COPD care Pathway after an evaluation of the pathway.

6.7 **Outcomes**

6.7.1 **Primary:** The primary outcome is the feasibility of using this COPD care model in a hospital setting. In this practical experiment, feasibility will be defined by recruitment of 50 patients (7-8 per month x 7 months) to the care pathway, with an 85% completion rate (care model completion). This will be calculated using the number of completed pathway documents divided by the total number of care pathways initiated at the time of admission. We will critically review each document for completion.

6.7.2 **Secondary:** There are four secondary outcomes for this study.

6.7.2.1 **Qualitative Implementation Metrics:** Implementation of the care pathway will be evaluated by HCPs (nursing staff, physician caregivers, and allied health professionals). Participants are asked to complete a questionnaire and participate in a focus group with other HCPs. During focus groups, common themes for barriers to implementation will be identified using a-priori selected questions. We will consider success of implementation if no significant barriers are identified through group consensus in the focus groups and if 80% of questionnaire responses in each category fall into the “agree” or “strongly agree” responses.

6.7.2.2 **Knowledge Translation Metrics:** We will measure success in knowledge translation with achievement of 80% adherence to basic COPD care guideline standards including use of appropriate antibiotics, systemic steroids, bronchodilators, venous thromboembolism prophylaxis, and advanced directives documentation. Adherence will be calculated from direct review of the care pathway documents after completion.
6.7.2.3 Patient Reported 'Health Confidence': Health confidence is a measure of the engagement of a patient in his or her own health (24). Greater health confidence is associated with improved outcomes, better experiences with care, and improved health resource utilization and cost (24,25). Health confidence will be measured using a four-item scaled survey: 1) I know enough about my health, 2) I can look after my health, 3) I can get the right help if I need it, and 4) I am involved in decisions about me. Participants answer each of the statements with the following scale: strongly agree, agree, not sure, or disagree. Patients who report 'strongly agree' for each of the above-mentioned statements are considered to have a higher level of health confidence than participants who report 'disagree'. These statements have demonstrated adequate psychometric properties and construct validity in preliminary testing (26). Formal permission for utilization of this tool in this study was obtained from the developer (T. Benson, R-OUTCOMES Ltd., Bristol, UK). The health confidence survey will be administered at the start of the education session in hospital, and repeated at 3 months, during a follow-up visit in the Pulmonary Function Test laboratory of the Ottawa Hospital, General campus. We aim for 80% completion of the “Health Confidence Score” among patients using the care model.

6.7.2.4 Patient Reported ‘Quality of life’: Patients quality of life can be measured with the “Health Related Quality of Life Score”, or 'howRu' tool which has been validated against other quality of life tools. This tool is a four-item scaled survey: 1) Pain or discomfort, 2) feeling low or worried, 3) Limited in what I can do, and 4) require help from others. Participants answer each of the statements with the following scale: none, a little, quite a lot, or extreme. Those who report 'none' for each of the above-mentioned statements are considered to have a better quality of life than those who respond 'extreme'. These statements have demonstrated adequate psychometric properties and construct validity in preliminary testing (26). Formal permission for utilization of this tool in this study was obtained from the developer (T. Benson, R-OUTCOMES Ltd., Bristol, UK). This survey will be administered at the start of the education session in hospital, and repeated at 3 months, during a follow-up visit in the PFT laboratory. We aim for
80% completion of the “Quality of Life Score” among patients using the care model

6.7.2.5 Health Service Metrics: We will use the Ottawa Hospital Data Warehouse (TOHDW) to measure length of stay, cost per weighted case, 30-day readmission, mortality, intensive care unit admission, intensive care unit length of stay, and number of hospitalizations in the 2-year window prior to the current admission. TOHDW is a relational database that captures clinical and administrative data for unique hospital encounters. Patient participants death within 1-year post-discharge of index hospitalization will be obtained from the Institute for Clinical Evaluative Sciences (ICES). ICES is a data repository includes records from Ontarians eligible to receive health care through the publicly-funded provincial insurance and benefit programs. We have the capacity to link these data to our cohort at TOH, by following appropriate privacy and approvals procedures with the ICES team.

6.8 Data Sources:

6.8.1 Electronic Health Record, COPD Pathway Documents: We will collect patient-related data using and some feasibility data using a combination of vOacis and the COPD care model document. These data points are detailed in the case report forms.

6.8.2 Focus Groups and Questionnaires: We will gather data from focus groups of HCPs to assess our implementation outcomes, and questionnaires provided to the HCPs who use the care models.

6.8.3 Patient Questionnaires: We will gather data from the COPD Assessment Test (CAT) and Health Confidence scores (HCS) to assess the symptom burden and engagement of patients.

6.8.4 TOH Data Warehouse (TOHDW): Health service metrics including length of stay, cost per weighted case, readmissions, mortality, and ICU admissions will be ascertained from the Data Warehouse. A separate Data Specification Form (DSF) has been initiated for this data request.

6.8.5 Institute for Clinical Evaluative Sciences (ICES): We will link to the Registered Persons Database (RPDB) through ICES to determine death within 1 year of patient...
participants. OHIP numbers will be added to the study dataset by the TOH DW and sent to ICES using encrypted FTP methods (as per usual protocol).

6.9 Data Collection: The following figure illustrates when data will be collected for participant during the study. The two focus groups will be conducted during the pilot, one in January 2018 and the other in March 2018. Questionnaires of HCPs will be gathered throughout the study period.

Patient data will be collected at three time-points:

1) **During hospitalization**: Includes COPD Pathway Phases 1 to 3. Patient data relating to demographics, frailty rating, COPD diagnosis, lung function, oxygen use, smoking status, and symptom burden will be collected from the hospital chart. The study respiratory therapist will enter this data in a Case Report Form for Respiratory Therapists. Patient participants are asked to complete a baseline health confidence and quality of life questionnaire at the beginning of hospitalization (Part A – Patient In Hospital Questionnaire).

2) **3-Months Post-Discharge**: Includes COPD Pathway Phase 4. During a post-discharge visit in the PFT laboratory of the General Campus at TOH, patient participants will be asked to complete a follow up questionnaire (Part B – Patient Post-Discharge Questionnaire). During this visit, a review will be undertaken of community services accessed by the patients, and any referral issues will be rectified if needed.

3) **At Study Conclusion**: Data collection in this phase will be from TOHDW) and ICES. We will collect all health service outcome data up to 6 months post-discharge from the TOHDW. This will include initial hospital length of stay, mortality, ICU admission, 30-day readmission, and cost per weighted case. From ICES, we will collect data from the Registered Persons Database (RPDB) to determine death within 1-year post-discharge of index hospitalization.
## COPD care Model Protocol

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### Figure 1 – Details for each point of data collection

*As part of the study, patient participants are invited for a 3-month follow-up in the PFT laboratory.*

### 7.0 STUDY TIMELINE

There are 5 distinct phases to the study: 1) pre-implementation, 2) hire, 3) educate, 4) implementation and data collection, and 5) finalize results and plan for next steps.

<table>
<thead>
<tr>
<th>PRE-IMPLEMENTATION</th>
<th>HIRE</th>
<th>EDUCATE</th>
<th>IMPLEMENTATION AND DATA COLLECTION</th>
<th>FINALIZE RESULTS AND PLAN FOR NEXT STEPS</th>
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</table>

* = Focus groups with healthcare professionals

### Figure 2 - Study Timeline

**Pre-Implementation:** Finalize the COPD pathway documents, engage the nursing staff in initial education, trial the pathway on 5 patients, and conduct 2 PDSA cycles with subsequent pathway revisions (Plan, Do, Study, Act), based upon preliminary nursing and physician.

**Hire:** Hire clinical research assistant and submit research ethics board application

**Educate:** Clinical care team regarding individual components and application of the care model (nurses, physicians, respiratory therapists, allied health). Create secure database to store study data.
Implementation and Data Collection: Implementation of the care model on the respiratory ward. Data collection and organization, Education sessions and post-rotation focus groups with each new group of physician trainees on the ward (once per month), Focus groups (January 2018 and March 2018) and questionnaires with nursing, respiratory therapy, and allied health staff.

Finalize results and plan for next steps: Write manuscript, plan the design of next steps (cluster randomized trial).

8.0 DATA MANAGEMENT

The data collected will be password protected and will not leave TOH. Only study personnel will have access to the study data. A study master list (containing MRN’s) will be linked to a study ID. This master linking file will be kept separate from the main study dataset in a protected folder on a secure TOH sever. Only the unique study ID will be used on the patient questionnaires and study case report forms. The study files will not be stored on the hard drives of portable devices or on USB keys.

OHIP numbers will be added to the study dataset and sent to ICES using encrypted FTP methods (as per usual protocol). Research staff will not see the OHIP numbers as they are added by the Performance Measurement designate as part of the transfer process. All data is de-identified and is linked at ICES using the ICES Key Number (IKN). Data will not leave ICES (TOH). Only study personnel will have access to the study data. The OHSN-REB, OHRI, and UOHI may review relevant study records under the supervision of the investigator for audit purposes.

9.0 FUNDING & COLLABORATION

The Ottawa Hospital Academic Medical Organization (TOHAMO) has awarded a $100,000 grant to conduct this pilot project. The Lung Association and Ontario Thoracic Society has also awarded $47,000 for this pilot project.

The Ottawa Hospital has provided in-kind resources for development of this project, via specific commitments from individuals in clinical nursing, nursing professional practice, respiratory therapy, pharmacy, senior management, and allied health care.

The Department of Medicine Patient Safety and Quality Committee has also provided in-kind support and resources for this project.
The Canadian Foundation for Healthcare Improvement (CFHI) has also provided in-kind support to this project to assist with scaling and promotion of the care pathway concept in COPD care.

Reference List


2. Performance Measurement. The Ottawa Hospital Data Warehouse. Ottawa, Ontario, Canada;


Appendix A - Standard COPD Education Session in Hospital

1. Review the definition of COPD, symptoms, and the common causes.

2. Discuss the concept of ‘COPD Flare-up’s, including a definition, review of common triggers, and early recognition of symptoms.

3. Review strategies to prevent worsening of symptoms (exercise, good nutrition, smoking cessation, medication use).

4. Discuss smoking cessation where applicable and provide relevant community resources for smoking cessation (example: Ottawa MyQuit Program, Heart Institute Smoking Cessation Clinic, etc.)

5. Review medications used to prevent and relieve symptoms

6. Demonstrate and confirm inhaler technique with attention to the appropriateness of the inhaler delivery device

7. Demonstrate and review breathing and cough techniques to clear secretions

8. Discuss with patient the potential benefit of community COPD education programs for ongoing support, pulmonary rehabilitation programs (including maintenance rehabilitation), support from the COPD outreach team, and referral to the HealthLinks program offered by the Champlain LHIN

   a. Review the best community program option for individual patients, based on patient preference, location, and services provided.

If appropriate, review and discuss exercise goals to consider once recovered from acute exacerbation.

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1 Kruis, (2013) Adapted from the ‘Living Well with COPD™’ educational materials from the McGill University Health Center, in Montreal, Canada.
### Clinical Frailty Scale (At baseline, at least 2 weeks before hospitalization)

<table>
<thead>
<tr>
<th>Int.</th>
<th>Diagram</th>
<th>Frailty Scale Description</th>
<th>Expected Goal of Care</th>
<th>Consider Consulting Services</th>
<th>Date (yyyy/mm/dd)</th>
<th>Initials</th>
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<td></td>
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<td><strong>Well:</strong></td>
<td>Return to independent living, self-manage breathing techniques, secretion clearance, recognize early symptoms of COPD exacerbation.</td>
<td>Respiratory Therapy (for teaching by CRE)</td>
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<td><strong>Managing Well:</strong></td>
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<td>Medical problems are well controlled, but not regularly active beyond routine walking.</td>
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<td><strong>Vulnerable:</strong></td>
<td>Return to independent living, self-manage breathing techniques, secretion clearance, recognize early symptoms of COPD exacerbation.</td>
<td>Respiratory Therapy (for teaching by CRE)</td>
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<td>Not dependent on others for help, but symptoms limit activities.</td>
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<td><strong>Mildly Frail:</strong></td>
<td>Return home with additional services, consider relocation to assisted living facility if appropriate, self-manage breathing techniques, secretion clearance, recognize early symptoms of COPD exacerbation.</td>
<td>Respiratory Therapy (for teaching by CRE)</td>
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<td>More evident slowing, need help in high order instrumental activities of daily living (finances, transportation, heavy housework, medications)</td>
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<td>Progressive impairment of shopping, walking outside alone, meal preparation, housework.</td>
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<td><strong>Moderately Frail:</strong></td>
<td>Return home with all outside activities and with sleeping house, frequently have problems with stairs, need help with bathing, minimal assistance (cuing, standby) with dressing.</td>
<td>Respiratory Therapy (for teaching by CRE)</td>
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<td><strong>Severely Frail:</strong></td>
<td>Strongly consider assisted living (either with services in current dwelling or by relocation to new facility), understands severity of illness and the limits this places on functional ability.</td>
<td>Physical therapy, Occupational Therapy, Social Work</td>
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<td>Completely dependent on others for personal care (physical or cognitive). Stable, not at high risk of dying (within 6 months).</td>
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<td><strong>Very Severely Frail:</strong></td>
<td>Completely dependent, approaching the end of life, could not recover even from a minor illness.</td>
<td>Physical therapy, Occupational Therapy, Social Work</td>
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<td><strong>Terminally Ill:</strong></td>
<td>Approaching the end of life, applies to people with a life expectancy less than 6 months, who are not otherwise evidently frail.</td>
<td>Social Work, Palliative Care (MD to complete), if returning home:</td>
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<td><strong>Coping:</strong></td>
<td>Strongly consider palliative care consultation, arrange hospice, long term care, or palliative care at home.</td>
<td>Social Work</td>
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</tbody>
</table>
### PHASE 1: Rescue Treatment

<table>
<thead>
<tr>
<th>Critical Path</th>
<th>Patient Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assessment/Treatment</strong></td>
<td><strong>Assessment/Treatment</strong></td>
</tr>
<tr>
<td>• Vital signs and SpO₂ q4h</td>
<td>• Vital signs within normal limits, afebrile</td>
</tr>
<tr>
<td>• Chest and respiratory assessment q shift and prn</td>
<td>• Optimal saturation achieved</td>
</tr>
<tr>
<td>• Assess bowel function</td>
<td>• Heart rate (less than 100 beats/minute at rest)</td>
</tr>
<tr>
<td>• Assess for anxiety q shift (if anxiety severe, consider psychology consult)</td>
<td>• Decreased use of respiratory accessory muscles</td>
</tr>
<tr>
<td><strong>Category Status</strong></td>
<td><strong>Category Status</strong></td>
</tr>
<tr>
<td>• Ensure category status form completed by physician - Init _____ Date __________</td>
<td>• Category status completed</td>
</tr>
<tr>
<td><strong>Activities</strong></td>
<td><strong>Activities</strong></td>
</tr>
<tr>
<td>• Activity as tolerated</td>
<td>• Tolerating activity level</td>
</tr>
<tr>
<td>• Up in chair for meals (TID)</td>
<td><strong>Nutrition</strong></td>
</tr>
<tr>
<td></td>
<td>• Tolerating diet</td>
</tr>
<tr>
<td><strong>Nutrition</strong></td>
<td><strong>Smoking Cessation Interventions</strong></td>
</tr>
<tr>
<td>• As ordered/tolerated</td>
<td>• No symptoms of nicotine withdrawal (headache, nausea, irritability, anxiety)</td>
</tr>
<tr>
<td>• BMI = kg/m² - Init _____ Date</td>
<td><strong>Discharge Planning</strong></td>
</tr>
<tr>
<td>• Consult Registered Dietitian using NUT 51 if BMI 21 or less, or patient report significant weight loss = Init _____ Date</td>
<td>• Appropriate referrals completed and sent (See action items of Frailty Scale Leaflet)</td>
</tr>
<tr>
<td>• Provide nutrition booklet to patient, if appropriate</td>
<td><strong>Discharge Planning</strong></td>
</tr>
<tr>
<td>• Consult SLP if concerns with swallowing/aspiration - Init ____ Date</td>
<td></td>
</tr>
</tbody>
</table>
### Appendix B - COPD Care Pathway – Order Set (page 3 of 7)

**PHASE 1: Rescue Treatment (continued)**

Patient progress corresponds with clinical pathway: D: 8–12 h day shift  E: evening shift, if applicable  N: 8–12 h night shift

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<td>Signature:</td>
</tr>
<tr>
<td>E</td>
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<td>No</td>
<td>Signature:</td>
</tr>
<tr>
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<td>Signature:</td>
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<tr>
<td>Date: (yyyy/mm/dd)</td>
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<tr>
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<td>E</td>
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</tr>
<tr>
<td>N</td>
<td>Yes</td>
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**Variance Codes (VC):**

<table>
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<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>492</td>
<td>Not discharged by end of pathway – continued need for acute care</td>
</tr>
<tr>
<td>510</td>
<td>Not discharged by end of pathway – non-medical reason</td>
</tr>
</tbody>
</table>

NTV: Non-Tracking Variance
OFF: Ordered off clinical pathway
## PHASE 2: Optimization Phase

### Critical Path

**Assessment/Treatment**
- Vital signs and SpO₂ q8h
- Chest and respiratory assessment q shift and prn
- Assess for anxiety q shift (if anxiety severe, consider psychology consult)

**Provide Patient/Family Education**
- Mark off once completed with patient:
  - Provide standard COPD education - Init Date
  - Review inhaler device technique - Init Date
  - Review pursed lip breathing, deep breathing, and coughing exercises - Init Date
  - Review relaxation techniques and positioning to reduce dyspnea - Init Date
  - Write order for spirometry in the chart, if required to confirm COPD diagnosis (MD to assign) - Init Date
  - Ensure that spirometry request sent to Module R prior to discharge (to be done as an inpatient, or outpatient, depending on availability) - Init Date
  - Write order in chart for referral to COPD outreach program if patient meets criteria and send referral - Init Date
  - If patient meets criteria for outpatient pulmonary rehabilitation, write order in chart to suggest referral to appropriate program (MD will send referral) - Init Date
  - If patient would benefit from community lung health resources after discharge from hospital (education, maintenance rehabilitation, etc.), write order in chart with referral suggestions (MD will send referral) - Init Date
  - Assess and qualify patient for home oxygen therapy if indicated

**Smoking Cessation/Counselling**
- Provide patient nicotine replacement therapy as per orders (patch, gum, inhaler)

**Activity/ADL’s**
- Activity as tolerated
- Up in chair for meals (TID)
- Up to bathroom or commode – if able
- Ambulate in hallway – if able
- Assist and encourage with personal care

**Nutrition**
- As ordered/tolerated

### Patient Outcomes

**Assessment/Treatment**
- Vital signs within normal limits, alebrile
- Optimal saturations achieved
- Heart rate (less than 100 beats/minute at rest)
- Decrease in anxiety

**Patient/Family Education**
- Adequate use of inhaler device (including mouth care)
- Effective cough and expectoration techniques
- Patient verbally expressing feeling less anxious
- Spirometry suggested if required
- Need for home oxygen assessed
- COPD outreach and rehabilitation referrals suggested if required

**Smoking Cessation/Counselling**
- No symptoms of nicotine withdrawal

**Activity**
- Tolerating activity level
- Increasing mobility level
- Returning to baseline level of mobility

**Nutrition**
- Tolerating diet
- Good swallowing function, no aspiration
- Improvement in weight and oral intake

**Initiate Early Discharge Planning**
- Patient understands limitations in level of function and need for additional home services (or assisted living) if required
- Patient and family concerns heard and relayed to allied health and physician team members
- Home oxygen assessment started, if required
### PHASE 2: Optimization Phase (continued)

Patient progress corresponds with clinical pathway: D: 8-12 h day shift  E: evening shift, if applicable  N: 8-12 h night shift

<table>
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<th>Initials: _____</th>
<th>Time: ______</th>
<th>NTV – circle above, VO _____</th>
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<tbody>
<tr>
<td></td>
<td>E □ Yes □ No</td>
<td>Signature: ______________________</td>
<td>Initials: _____</td>
<td>Time: ______</td>
<td>NTV – circle above, VO _____</td>
</tr>
<tr>
<td></td>
<td>N □ Yes □ No</td>
<td>Signature: ______________________</td>
<td>Initials: _____</td>
<td>Time: ______</td>
<td>NTV – circle above, VO _____</td>
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<th>NTV – circle above, VO _____</th>
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<tr>
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<td>E □ Yes □ No</td>
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<td>Initials: _____</td>
<td>Time: ______</td>
<td>NTV – circle above, VO _____</td>
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<tr>
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<td>Time: ______</td>
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<td>Signature: ______________________</td>
<td>Initials: _____</td>
<td>Time: ______</td>
<td>NTV – circle above, VO _____</td>
</tr>
</tbody>
</table>

RT Signature

Signature: ______________________ | Initials: _____

Variance Codes (VC)

- 492 Not discharged by end of pathway – continued need for acute care
- 510 Not discharged by end of pathway – non-medical reason

NTV Non-Tracking Variance

OFF Ordered off clinical pathway

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### PHASE 3: Safe Transition

<table>
<thead>
<tr>
<th>Critical Path</th>
<th>Patient Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assessment/Treatment</strong></td>
<td>Vital signs within normal limits, afebrile</td>
</tr>
<tr>
<td>- Vital signs and SpO₂ q shift</td>
<td>- Optimal saturation achieved</td>
</tr>
<tr>
<td>- Chest and respiratory assessment q shift and prn</td>
<td>- Heart rate (less than 100 beats/minute at rest)</td>
</tr>
<tr>
<td>- Access for anxiety q shift (if anxiety severe, consider inpatient psychology consult)</td>
<td>- Decrease in anxiety</td>
</tr>
<tr>
<td><strong>Activity/ADL's</strong></td>
<td><strong>Activity/ADL's</strong></td>
</tr>
<tr>
<td>- Activity as tolerated</td>
<td>- Tolerating activity level</td>
</tr>
<tr>
<td>- Up in chair for meals (TID)</td>
<td>- Increasing mobility level</td>
</tr>
<tr>
<td>- Up to bathroom or commode – if able</td>
<td>- Returning to baseline level of mobility</td>
</tr>
<tr>
<td>- Ambulate in hallway – if able</td>
<td></td>
</tr>
<tr>
<td>- Assist and encourage with personal care</td>
<td></td>
</tr>
<tr>
<td><strong>Nutrition</strong></td>
<td><strong>Nutrition</strong></td>
</tr>
<tr>
<td>- As ordered/tolerated</td>
<td>- Tolerating diet</td>
</tr>
<tr>
<td></td>
<td>- Good swallowing function, no aspiration</td>
</tr>
<tr>
<td><strong>Medication Teaching</strong></td>
<td><strong>Medication Teaching</strong></td>
</tr>
<tr>
<td>- Page Respiratory Pharmacist to complete medication review</td>
<td>- Patient understands indication for use of long and short acting medications before discharge</td>
</tr>
<tr>
<td>- Init Date</td>
<td></td>
</tr>
<tr>
<td><strong>Smoking Cessation/Counselling</strong></td>
<td><strong>Smoking Cessation/Counselling</strong></td>
</tr>
<tr>
<td>- Continue nicotine replacement</td>
<td>- No symptoms of nicotine withdrawal</td>
</tr>
<tr>
<td><strong>Follow-up Appointments/Services</strong></td>
<td><strong>Follow-up Appointments/Services</strong></td>
</tr>
<tr>
<td>- Specialist follow-up arranged by clerks based on physician recommendations - MD init Date</td>
<td>- Patient receives written confirmation of appointment dates and times</td>
</tr>
<tr>
<td>- GP follow-up arranged within 2 – 4 weeks of discharge (ask patient to call)</td>
<td></td>
</tr>
<tr>
<td>- Referral to COPD community services sent (check all that apply):</td>
<td></td>
</tr>
<tr>
<td>- COPOD outreach team</td>
<td>MD init Date</td>
</tr>
<tr>
<td>- Lung Association Referral</td>
<td>MD init Date</td>
</tr>
<tr>
<td>- Champlain Lung Health Referral</td>
<td>MD init Date</td>
</tr>
<tr>
<td>- TOH COPD Education (PFT Lab)</td>
<td>MD init Date</td>
</tr>
<tr>
<td>- TRC Pulmonary Rehabilitation</td>
<td>MD init Date</td>
</tr>
<tr>
<td>- Montfort Pulmonary Rehabilitation</td>
<td>MD init Date</td>
</tr>
<tr>
<td>- Other</td>
<td>MD init Date</td>
</tr>
<tr>
<td><strong>Discharge Planning</strong></td>
<td></td>
</tr>
<tr>
<td>- Ensure home oxygen arranged if necessary</td>
<td></td>
</tr>
</tbody>
</table>

Start Date: yyyy mm dd
### Chronic Obstructive Pulmonary Disease Exacerbation (COPD-E) Admission Orders

<table>
<thead>
<tr>
<th>Init.</th>
<th>Non-Medication</th>
<th>Init.</th>
<th>IV and Medication (Medication, dose, route, frequency)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Non-Medication**
  - Inhale clinical pathway for: COPD – Exacerbation (CP 110A)
  - Administer Service:
  - Attending Doctor:
  - Vital signs as per pathway
  - OR
  - Weight and BMI measurement (kg/m²) on admission (document BMI in pathway)
  - Diet: NPO, high calorie, high protein diet, Diabetic diet, Other
  - Isolation Precautions: Droplet Precautions, Airborne Precautions, Contact Precautions
  - Tests: PA/Lateral chest x-ray (enter on CPDE)
  - OR
  - Portable chest x-ray (enter on CPDE)
  - EKG
  - GCS, Creatinine, Na, K, Cl, HCO₃ daily x 3 days
  - OR
  - CXR, Tri
  - Arterial Blood Gas OR Venous Blood Gas
  - Nasopharyngeal swab for respiratory viruses
  - Sputum for bacterial culture and sensitivity
  - OR
  - OR
  - Oral
  - Oxygen: Titrate oxygen for saturations between 88 – 92% (policy PC 06-a-184)
  - OR
  - Titrate oxygen for saturations 92% or more
  - OR
  - Needy Ht if patient requires greater than 50% Fio₂
  - Non-Invasive Ventilation: Initiate Bi-Level Ventilation (consider if pH less than 7.35, increased work of breathing)
  - OR
  - Bi-Level initial settings:
  - IFAP (insert cmH₂O, EAP (insert cmH₂O)
  - Category Status: Category status compressa

- **IV Flows:**
  - Oral: Normal saline 100 mL/hour x 2 hours THEN reassess
  - OR
  - IV fluids: Metyrapone 50 mg PO 6 times per day x 5 days THEN reassess
  - OR
  - Antihistamines: 50 mg PO 6 times per day x 5 days THEN reassess
  - OR
  - OR

- **Select an antibiotic if patient has at least 2 of the following 3 criteria present:**
  - 1) Increased sputum production
  - 2) Increased sputum volume
  - 3) Increased dyspnea

- **Select an antibiotic from a different drug class than was used in the last 3 months:**

- **Antibiotics (Dose adjustment may be necessary):**
  - Azithromycin 500 mg PO q48h OR 500 mg PO q24h
  - OR
  - Ceftriaxone 1 g IV q48h
  - OR
  - Doxycycline 100 mg PO q24h
  - OR
  - Levofloxacin 750 mg PO q24h
  - OR
  - Trimethoprim/sulfamethoxazole 1 DS tab PO q24h

- **Antihistamines (may be necessary in renal dysfunction):**
  - Cetirizine 5 mg PO q24h
  - OR
  - Levocetirizine 10 mg PO q24h

- **Beta Agonist Therapy (choose one):**

- **Salmeterol (Flomist) MDI 100 mcg:**

- **Salbutamol (Ventolin) MDI 100 mcg:**

- **Salbutamol (Ventolin) via nebulizer:**

- **Oral: Glucocorticosteroids:**

- **Anticholinergic Therapy (choose one):**

- **ICS/LABA Therapy:**

- **Nasal Spray:**

- **Other:**

- **Nicotine Replacement Therapy:**

- **DVT Prophylaxis:**

- **Complete HEP 107 (nicotine replacement therapy)**

- **Other:**

- **Bowel Protocol:** Physician to complete constipation protocol SPO 226

<table>
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<th>Physician (printed)</th>
<th>Signature (Physician)</th>
<th>Date (MM/DD/YYYY)</th>
<th>Time</th>
<th>Processed by</th>
<th>Signature (Nurse)</th>
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